

# SCAFFOLDING: H.I.R.A

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## ABSTRACT

Present work reviews detail study of Scaffolding and Hazard Identification & Risk Assessment (HIRA). HIRA is carried out for identification of undesirable events that can be led to hazards. The work of hazard and risk analysis is to identify and analyze hazards, the event sequence leading to hazard and risk associated with hazardous events/ conditions. As the part of the work, hazard identification and risk analysis were carried out for Scaffolding activity and the hazards were identified and risk analysis was carried out. The different activities were divided into high, medium, and low depending upon their probability and consequences/ severity. These have been presented in table no 1. The high risks activities have been marked in red color are un-acceptance and must be reduced. The risks which are marked in yellow color are tolerable but efforts must be made to reduce risk without expenditure that is grossly disproportionate to the benefit gained. The risk which are marked in green color have the risk level so low that it is not required for taking actions to reduce its magnitude any further.

The study helps to understand Scaffolding and how to identify and analyze risk in it as well as its control measures.

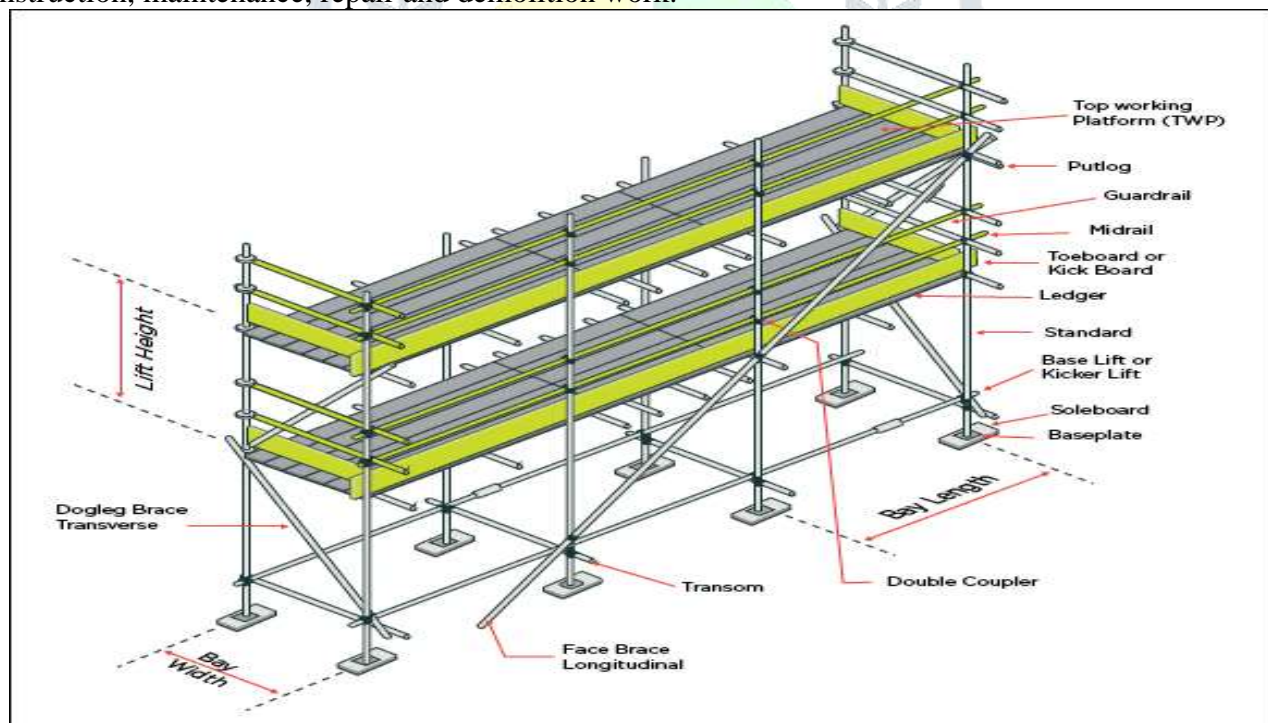
## KEYWORDS

Construction Industry, Scaffolding, Hazard Identification, Risk, Assessment, HIRA, Probability, Severity.

## INTRODUCTION

### ➤ Scaffolding-

A scaffold is a temporary structure that provides support for workers, plant and materials used in building, construction, maintenance, repair and demolition work.



(Photo No.01: Scaffolding)

Scaffold foundation should be verified before erection. Loose or friable packing like bricks should not be used as support. For height more than 15 mt, steel scaffold should be preferred and not a wooden one. Inspection after 7 days and after every damage is necessary. Points to be checked include: stability, ties and fixing, alignment of members, bending, tightness of lashing or couplers, planks, platforms, guard rails,

toe boards and condition of ladders. Warning notice should be displayed near incomplete or damaged scaffold. Dismantling should be carried out in the reversed order to erection. Materials should not be thrown from heights and should not be left lying here and there. They should be properly collected. After completion of work, all scaffold materials should be stored in a dry protected place using racks, boxes or trays. The damaged parts should be replaced or repaired, cleaned, treated with preservative or paint. Couplers and other fittings should be lubricated. Chapter-XIX (R.188 to 205) of the Building and Construction Workers Central Rules, 1998 gives provisions regarding scaffold.

**Main hazards with scaffolding are:**

1. Unsuitable or faulty material of construction.
2. Inadequately supported scaffold boards.
3. Improper platform width and thickness.
4. Non-securing or bracing scaffold to the structure. Damaged or wrong couplers.
5. Unsecured ladders slipping.
6. Omission of guard rails or toe boards.
7. Overloading the scaffold.
8. Erected on uneven ground.

**Scaffolding General Requirements:**

The scaffold serves two purposes. One is to provide a convenient platform for persons to work at height and the other is to provide a safe means of access to all places where any person may be required to work at any time. Accidents at scaffolds are generally caused either due to direct collapse of the scaffold or as a result of persons or material falling off the scaffold. The scaffolds should be of sound material, sufficient strength (4 times the expected load) and properly designed. Their erection, alteration and dismantling should be done under the supervision of a competent person. They should be securely supported or suspended and should be properly strutted or braced to ensure stability. Normal size is 4 cm thick x 23 cm wide x 3-4 m long. Steel components of tubular (normally 5 cm dia) scaffolds should conform to IS:2750 and 4014 for Steel Scaffoldings. Wood and bamboo should meet the specifications laid down by the Forest Research Institute and College, Dehra Dun. Overhead protection, not more than 3 m above the work platform of the scaffold becomes necessary if overhead work is going on.

Similarly, for the persons working or passing under a scaffold, at least 30 cm projected canopy or screen should be provided at the scaffold working level. In high wind or storm work on scaffold should be avoided. No hot work should be carried out on wooden platform. Firefighting facility should be kept nearby.

**Means of Access:**

Failure to provide such access has caused serious accidents. The safe means of access may be ladders, portable or fixed, ramps, runways, gangways or stairways. It is recommended that portable ladders should not be used as a means of access where the height of the scaffold platforms exceeds 3.75 m. Slope of the ladder should be 4 verticals to 1 horizontal. It should rise 1 m above landing platform and securely fixed at upper end. The use of cross braces or framework of the scaffold as a means of access should not be permitted.

**Width of working platforms:**

The following minimum widths are recommended as a general rule.

1. If the platform is used as a footing only- 0.7 m
2. If the platform is used for the deposit of material- 0.9 m
3. If the platform is used for support of any higher platform- 1.1 m
4. If the platform is one upon which stone or bricks are dressed or roughly shaped- 1.3 m
5. If the platform is used for support of any higher platform and is one upon which stone or bricks are dressed or roughly shaped 1.5 m.

**Railings and toe-boards:**

A common cause of accidents at scaffolds is the failure to provide railings at the exposed sides of the scaffold platforms. Often, the failure is when the scaffolding is erected for jobs of short duration.

Where materials are stacked on a platform, the height of the toe-board may have to be raised; or it may

even be necessary to cover the entire space between the top rail and the toe-board with wire netting or planks. Normal height of railing is 1 m and toe board 15 cm.

**Boards and planks in working platforms, gangways and ramps:**

For platforms of wooden planks, in general, the spacing should not exceed the following: Planks 32 mm thick 1 m

Planks 38 mm thick 1.5 m

Planks 50 mm thick 2.6 m

Boards or planks which form part of a working platform, gangway or ramp should not project beyond their end supports to a distance exceeding four times the thickness of the board or plank. 50 mm projection is desirable. Overlapping of boards is unsafe.

• **Hazards and Safety measures:**

Scaffolds should never be loaded in excess of the working load for which they are designed. Wood scaffolds are not generally painted. However, in case of ladders and certain permanent types of scaffolds such as the mobile scaffold, protection is generally provided by periodically treating them with a coating of linseed oil.

• **Types of Scaffold:**

Some common types of scaffold are as follows:

**1. Pole type scaffolds:**

It may be an independent structure or the putlog type erected and supported near wall or another structure. The uprights (vertical poles) should rest on strong foundation to support load without settlement. They should not be kept more than 3 m apart. Tubular uprights have steel base plates placed on wooden sole plates. Soft ground should be well rammed and leveled. Fixings like steel bolts, nails or fiber rope of approved size, joint pins and couplers should be properly fitted. For load bearing right-angled or swivel couplers should be used. Putlog couplers are useful for putlog members only. Putlog members (horizontal) should at least 10 cm be inserted in wall. Bracing (diagonal connection) should be tied to ensure structural stability and prevent buckling. To prevent overturning the scaffold should be secured at intervals not greater than 7.6 m vertically and horizontally.

**2. Rolling Scaffolds or Mobile Towers:**

Such scaffolds move on rollers (wheels) or castors with wheel locking device. They are portable and most useful for maintenance work. To prevent overturning, height should not be more than three times the minimum width of the base. Minimum base length should be 4 ft. While pushing or pulling the tower, persons should not ride on it. Tools and materials should be removed before moving. The top working platform must have handrails and toe boards. It should support 30 lb/ft<sup>2</sup> distributed load. Rigidity of the tower is secured by diagonal bracing on all four sides and on plan. Moving the tower by pulling at the top or leaning sideways should be avoided.

**3. Outrigger Scaffolds:**

It is a balcony type cantilever scaffold resting on wall. If other types of scaffold are possible, this type should not be used. The outriggers should be passed right through the wall and be secured on the inner side. Supporting hook between brick joints is dangerous. Platform should not project beyond 2 m from the wall. Guard rail and toe board should be provided.

**4. Swinging (Hanging) Scaffolds:**

Here the platform is hanging by two chain pulley blocks, ropes and hooks on supporting beam. Suspended platform can be raised or lowered as per need. Movement of both the ends should be simultaneously. The anchorage and the suspension gear should be strong enough to withstand the load with good factor of safety. Suspension ropes should withstand 6 times the intended load. Rope diameter shall be more than 0.75 inch. A safety rope shall be provided in addition to the suspension ropes. The width of the platform should be more than 50 cm and less than 90 cm. Guard rails and toe boards necessary on all the three sides open. The platform should be lashed or secured while in use, to prevent swaying. Each person working on swinging scaffold should wear safety belt with lifeline attached to an anchorage other than the scaffold itself.

**5. Suspended Scaffolds:**

Two or more platforms are suspended by ropes from overhead outriggers anchored to the building. Such scaffolds are designed with a factor of safety 4 and shall never be overloaded. Anchor plates



should be tied with U bolts. Counter weights are used to prevent overturning. Wire ropes (FS 6) are used to support scaffold. Hoisting drum (like winch) is used with at least 2 dead turns. Gap between handrail and toe board should be covered by a wire mesh of 38 mm and 16-gauge wire. Overhead protection should be provided if risk of falling objects is possible.

#### 6. Boatswain's Chair:

Boatswain's chair is used for supporting and hoisting single person in sitting position. General chair (seat) size is 60 cm x 30 cm, with 25 mm thick timber. Cleats extending in front to at least 23 cm should be securely fixed under the chair at both ends. The chair is supported by a suitable sling passing through the four corner holes in the chair for proper stability. The suspension rope is fixed to an overhead support or passed through a pulley block fastened to such support. The free end is secured to a conveniently accessible anchorage and the person in chair must wear a safety belt, the life line of which is secured to the tackle supporting the chair. Fiber rope slings should not be used if the person in the chair has to do welding or cutting work.

#### Main hazards with scaffolding are:

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Hazards associated with the Scaffolding are very dangerous and it cannot ignore. Therefore, HIRA of Scaffolding activity is described in the present study.

#### ➤ Hazard identification and risk assessment (HIRA)-

A HIRA is a risk assessment tool that can be used to assess which hazards pose the greatest risk in terms of how likely they are to occur and how great their potential impact may be. It is not intended to be used as a prediction tool to determine which hazard will cause the next emergency.

#### The HIRA Process-

There are four steps to create and maintain a HIRA were described below in **Fig. No. 01**:

**1) Hazard Identification** - In this step the hazards that could impact your community are separated from those that cannot. This requires a review of all hazards and their causes to determine whether they may be a threat to your community. This may require the consultation of the scientific community, historical records and government agencies.

**2) Risk Assessment** - In this step the level of risk for each hazard is examined. This may involve speaking with hazard experts, researching past occurrences and possible scenarios. The likelihood of the hazard occurring and the potential impacts of the hazard on people, property, the environment, business and finance and critical infrastructure should be examined.

**3) Risk Analysis** - The information collected in the risk assessment step will be analyzed in this step. The desired outcome of the risk analysis is the ranking of the hazards. This highlights the hazards that should be considered a current priority for your emergency management program.

**4) Monitor and Review** - It is important to remember that a HIRA is an ongoing process and hazards and their associated risks must be monitored and reviewed.

### STUDY AREA-

The present work was carried out at a site Underground Metro Station.



(Photo No.02: Scaffolding on site)

### METHODOLOGY OF THE HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA):

The methodology of hazard identification and risk assessment shall include:

Steps and time frame for identifying and assessing the hazards. One must define the steps for the identification of hazards and a time frame for this identification. The following information should be included:

- Who will be responsible for the identification: for example, it may be the work place health and safety committee, or an individual or individuals appointed by the committee;
- The way in which the identification reports are processed: for example, they may be compiled and processed by the committee, or by individuals appointed by the committee: The identification time frame. The keeping of a record of the hazards.

After having identified the hazards, one must establish and maintain an identification record, either in print or electronic format.

A time frame for reviewing and, if necessary, revising the methodology. The date for the review of the identification: for example, the review of the identification method will be carried out every three years. To complete hazard identification, one can use techniques to identify hazards. Some examples of techniques include, but are not limited to: Work place inspections; Task safety analysis or job hazard analysis; Preliminary investigations; Potential accident factors; Failure analysis; Accident and incident investigations.

It is in your interest to adopt your own process and your own identification techniques so that they match one management procedures and the size of business. In fact, the identification method may vary depending on the size of the work place.

#### Analyze and estimate risk:

Risk is the determination of probability and severity of the credible accident/event sequences in order to determine magnitude and to priorities identified hazards. It can be done by qualitative, quantitative or semi quantitative method.

#### Methodologies of risk analysis-

A qualitative analysis uses words to describe the magnitude of potential severity and the probability that those severity will occur. These scales can be adapted or adjusted to suit the circumstances and different descriptions may be used for different risks. This method uses expert knowledge and experience to determine likelihood and severity category.

In semi-quantitative analysis, qualitative scales such as those described above are given values. The objective is to produce a more expanded ranking scale than is usually achieved in qualitative analysis, not to suggest realistic values for risk such as is attempted in quantitative analysis.

Quantitative analysis uses numerical values (rather than the descriptive scales used in qualitative and semi-quantitative analysis) for both severity and probability using data from a variety of sources such as past accident experience and from scientific research. Severity may be determined by modeling the outcomes of an event or set of events, or by extrapolation from experimental studies or past data. Severity may be expressed in terms of monetary, technical or human impact criteria, or any of the other criteria. The way in which severity and probability are expressed and the ways in which they are combined to provide a level of risk will vary according to the type of risk and the purpose for which the risk assessment output is to be used.

#### **Probability of an occurrence:**

This value is based on the probability of an event occurring. You may ask the question “How many times has this event happened in the past?” Assessing probability is based on worker experience, analysis or measurement. Probability levels range from “most likely” to “inconceivable.” For example, a small spill of bleach from a container when filling a spray bottle is most likely to occur during every shift. Alternatively, a leak of diesel fuel from a secure holding tank may be less probable.

#### **Severity of hazard:**

Severity can be divided into five categories. Severity is based upon an increasing level of severity to an individual’s health, the environment, or to property.

#### **RISK ASSESSMENT:**

Risk can be presented in a variety of ways to communicate the results of analysis to make a decision on risk control. For risk analysis that uses likelihood and severity in a qualitative method, presenting the result in a risk matrix is a very effective way of communicating the distribution of the risk throughout a plant and area in a workplace.

Risk can be calculated using the following formula:

$$P \times S = \text{Relative Risk (R)}$$

P = Probability

S = Severity

#### **Risk Matrix-**

To use this matrix, first find the severity column that best describes the outcome of risk. Then follow the probability row to find the description that best suits the probability that the severity will occur. The risk level is given in the box where the row and column meet.

The relative risk value can be used to prioritize necessary actions to effectively manage workplace hazards. Photo no 2, determines priority based on the following ranges:



RISK MATRIX						
PROBABILITY ↑	Very Likely - 5	5	10	15	20	25
	Likely - 4	4	8	12	16	20
	Possible - 3	3	6	9	12	15
	Unlikely - 2	2	4	6	8	10
	Very Unlikely - 1	1	2	3	4	5
		1	2	3	4	5
		<i>Negligible</i>	<i>Slight</i>	<i>Moderate</i>	<i>High</i>	<i>Very High</i>
SEVERITY →						
<b>Risk</b>	<b>Risk Level</b>	<b>Action</b>				
1 to 6	Low Risk	May be acceptable but review task to see if risk can be reduced further				
8 to 12	Medium Risk	Task should only be undertaken with appropriate management authorization after consultation with specialist personnel and				
15 to 25	High Risk	Task must not proceed. It should be redefined or further control measures put in place to reduce risk. The controls should be				

(Photo No.03: Risk Matrix)

**CONTROL:**

Definition: Control is the elimination or inactivation of a hazard in a manner such that the hazard does not pose a risk to workers who have to enter into an area or work on equipment in the course of scheduled work.

Hazards should be controlled at their source (where the problem is created). The closer a control to the source of the hazard is the better. This method is often referred to as applying engineering controls. If this does not work, hazards can often be controlled along the path to the worker, between the source and the worker. This method can be referred to as applying administrative controls. If this is not possible, hazards must be controlled at the level of the worker through the use of personal protective equipment (PPE), although this is the least desirable control.

**Selecting a suitable control:**

Evaluating and selecting short- and long-term controls; Implementing short-term measures to protect workers until permanent controls can be put in place; and Implementing long term controls when reasonably practicable.

For example, suppose a noise hazard is identified. Short-term controls might require workers to use hearing protection. Long term, permanent controls might remove or isolate the noise source.

**Types of Control:****Elimination:**

Getting rid of a hazardous job, tool, process, machine or substance is perhaps the best way of protecting workers. For example, a salvage firm might decide to stop buying and cutting up scrapped bulk fuel tanks due to explosion hazards.

**Substitution:**

Sometimes doing the same work in a less hazardous way is possible. For example, a hazardous chemical can be replaced with a less hazardous one. Controls must protect workers from any new hazards that are created.

**Engineering control:**

Redesign - Jobs and processes can be reworked to make them safer. For example, containers can be made easier to hold and lift.

Isolation - If a hazard cannot be eliminated or replaced, it can sometimes be isolated, contained or otherwise kept away from workers. For example, an insulated and air-conditioned control room can protect operators from a toxic chemical.

Automation - Dangerous processes can be automated or mechanized. For example, computer- controlled robots can handle spot welding operations in car plants. Care must be taken to protect workers from robotic hazards.

Barriers - A hazard can be blocked before it reaches workers. For example, special curtains can prevent eye injuries from welding arc radiation. Proper equipment guarding will protect workers from contacting moving parts.

Absorption - Baffles can block or absorb noise. Lockout systems can isolate energy sources during repair and maintenance. Usually, the further a control keeps a hazard away from workers, the more effective it is.

Dilution - Some hazards can be diluted or dissipated. For example, ventilation systems can dilute toxic gasses before they reach operators.

#### **Administrative controls:**

Safe work procedures - Workers can be required to use standardized safety practices. The employer is expected to ensure that workers follow these practices. Work procedures must be periodically reviewed with workers and updated.

Supervision and training – Initial training on safe work procedures and refresher training should be offered. Appropriate supervision to assist workers in identifying possible hazards and evaluating work procedures.

Job rotations and other procedures can reduce the time that workers are exposed to a hazard. For example, workers can be rotated through jobs requiring repetitive tendon and muscle movements to prevent cumulative trauma injuries. Noisy processes can be scheduled when no one is in the workplace.

Housekeeping, repair and maintenance programs - Housekeeping includes cleaning, waste disposal and spill cleanup. Tools, equipment and machinery are less likely to cause injury if they are kept clean and well maintained.

Hygiene - Hygiene practices can reduce the risk of toxic materials being absorbed by workers or carried home to their families. Street clothing should be kept in separate lockers to avoid being contaminated by work clothing. Eating areas must be segregated from toxic hazards. Eating should be forbidden in toxic work areas. Where applicable, workers should be required to shower and change clothes at the end of the shift.

#### **Personal Protective Equipment:**

Personal protective equipment (PPE):

Personal protective equipment means any equipment which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety and any additional accessory designed to meet that objective;

PPE is usually chosen to provide protection appropriate to each of type of hazard present. There are specifications for the types of PPE used for protecting an individual's head, eyes, footwear, limb and body, fire retardant clothing, respiratory, hearing, and personal flotation devices.

It may also include required apparel for example when traffic hazards are present high visible and distinguishable "vests must be worn"

Personal Protective Equipment (PPE) and clothing is used when other controls measures are not feasible and where additional protection is needed. Workers must be trained to use and maintain equipment properly. The employer and workers must understand the limitations of the personal protective equipment. The employer is expected to require workers to use their equipment whenever it is needed. Care must be taken to ensure that equipment is working properly. Otherwise, PPE may endanger a workers' health by providing an illusion of protection.

### **HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA) OF SCAFFOLDING-**

HIRA of Scaffolding presented below in Table No.01.



## RESULT

Scaffolding is the major part of construction industry. It includes high hazards, if adequate safety precautions were not taken. The present study aims to understand the scaffolding activity, its associated hazards and how it can be prevented. Hazard identification and risk assessment can be used to setup precedencies so that the most dangerous situations are addressed first and those least likely to occur and least likely to cause major problems can be considered later. As the part of the work, hazard identification and risk analysis were carried out for scaffolding activity and the hazards were identified and risk analysis was carried out. The different activities were divided into high, medium, and low depending upon their probability and consequences/ severity. These have been presented in table no 1. The high risks activities have been marked in red color are un-acceptance and must be reduced. The risks which are marked in yellow color are tolerable but efforts must be made to reduce risk without expenditure that is grossly disproportionate to the benefit gained. The risk which are marked in green color have the risk level so low that it is not required for taking actions to reduce its magnitude any further.

## DISCUSSION

The study also disclosed that systematic methods were used and risk was assessed by deliberate analyzation, checklist and health and safety regulations. Working at height, and manual handling observed to be most critical hazards in Indian Industry construction site. Based on methods used to communicate risk at construction sites, it was revealed that toolbox meetings, site meetings, posters and informal verbal communication are used to communicate risk. It was also found that safety committees and group supervisors play a vital role in communicating health and safety risks.

The study was very helpful to understand the scaffolding activity and its related hazards as well as what is HIRA & how it can be used to reduce the risk.

## FIGURE-

**Fig. No. 01:** Four steps to create and maintain a HIRA:

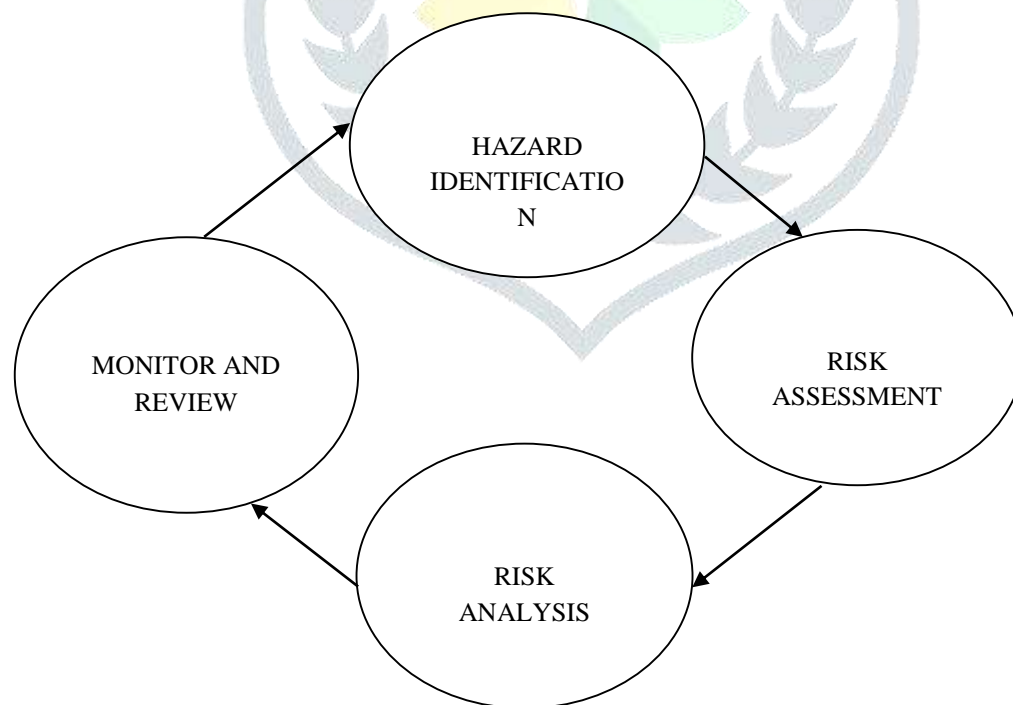


TABLE- HIRA of Scaffolding presented below:

Table No. 01 - HAZARD IDENTIFICATION RISK ASSESSMENT												
Activity: Scaffolding Location: Underground Metro station												
S/No.	HAZARD	Consequences	Pre-RISK EVALUATION			RISK	CONTROLS MEASURES	Action Taken	Post-RISK Evaluation			RISK
			S	P	R				S	P	R	
1	Stumbling	1.Personal injury	4	3	12	Medium	1. Maintain Proper Housekeeping 2. Provide proper access to work.	1. Provide inspection by Authorized Person. 2. Provide Scaffold Tag System.	4	1	4	Low
2	Unskilled workers	1.Serious Accident 2. Property damage.	4	3	12	Medium	1. Certified Scaffolder 2. Skilled workforce	1. Scaffolding should be done under the supervision of competent and certified supervisor. 2. Deploy competent and trained workforce 3. Scaffolders should be third party certified. 4. All working crew must be aware of safety protocols.	4	1	4	Low

3	Poor ground conditions	<ol style="list-style-type: none"> <li>1. Personal injury</li> <li>2. Serious accident</li> <li>3. Property damage</li> </ol>	4	2	8	Medium	<ol style="list-style-type: none"> <li>1. Clear the unnecessary material from ground.</li> <li>2. Proper Sole/Base plate.</li> </ol>	<ol style="list-style-type: none"> <li>1. Soleplate and base plate should be placed on the ground.</li> <li>2. continuous observation by scaffolding supervisor</li> </ol>	4	1	4	Low
4	Falling object hazards	<ol style="list-style-type: none"> <li>1. Personal injury</li> <li>2. Asset loss</li> <li>3. Fatal Injury</li> </ol>	5	3	15	HIGH	<ol style="list-style-type: none"> <li>1. PPE's</li> <li>2. Proper storage of tools</li> <li>3. Proper material handling</li> <li>4. Install toe Boards</li> </ol>	<ol style="list-style-type: none"> <li>1. All the workforce required to use mandatory PPE's</li> <li>2. Barricade the area where erection of scaffolding is in progress</li> <li>3. Restrict the unauthorized entry</li> <li>4. Proper railing system should be erected to prevent the falling of personnel.</li> <li>5. All the material should be bringing. Up/down with sack and rope</li> <li>6. Don't drop or throw scaffolding materials.</li> </ol>	5	1	5	Low



5	Tilting of scaffold, not tied.	1. Fall, injury 2. Damage to nearby equipment. 3. Personnel Injury.	5	2	10	Medium	1. Provide safety Pins. 2. Erection of Scaffolding per checklist. 3. Low weight	1. Use of standard scaffolding & conduct joint inspection before use. 2. Scaffolding erection to be verified in the light of scaffold check list by certified personnel. 3. Use of safety harness with double layered. 4. Load on scaffolding should be as per design. 5. Ensure cross/diagonal bracing tightened properly to avoid collision. 6. Provide scaffold tag system.	5	1	5	Low
6	In complete Scaffolding	Scaffolding collapse due to load personnel fall from height due to incomplete of scaffolding	5	3	15	HIGH	1. Scaffolding "complete" TAG 2. Incomplete scaffolding will be blocked by barricading tap	1. Scaffolding will be inspected by a competent person before applying scaffolding "Complete Tag" 2. Incomplete scaffolding will be blocked with barricading tap by scaffolding supervisor and barricading will not be removed till scaffolding complete	5	1	5	Low

								tag is applied				
7	Simultaneous Operation	Injuries, Fatalities	5	4	20	HIGH	1.No parallel activity 2.Evacuate area as defined	1. Simultaneous activities are strictly not allowed in the RT area. 2. Area will be cleared as declared by the performing authority. 3. Entry of unauthorized personnel is not allowed	5	1	5	Low
8	Electric shock	1. Burns and unconsciousness 2. Fatal Injury	5	2	10	Medium	1. Tool Box Talk 2. Dry the wet area 3. Provide adequate Height to Electric wires.	1. Tool box talk shall be conducted before work. 2. Install ELCB (Earth Leakage Circuit Breaker) 3. Close supervision should be required	5	1	5	Low
9	Manual handling/lifting steel rod without adequate PPE	1.Recordable Shoulder and Hand Injury	4	3	12	Medium	1.Adequate PPE should provide like shoulder pad, hand gloves.	1. Regular supervision by site engineer/supervisor.	4	1	4	Low

GENERAL COMMENTS:

1. Tool Box Talk will be conducted prior to job start.
2. Unauthorized entry of the person not allowed in work premises.
3. Proper PPE's are must for all the crew.
4. Stand by vehicle must be present at the site in case of emergency.
5. S = Severity; P = Probability; R=Risk





